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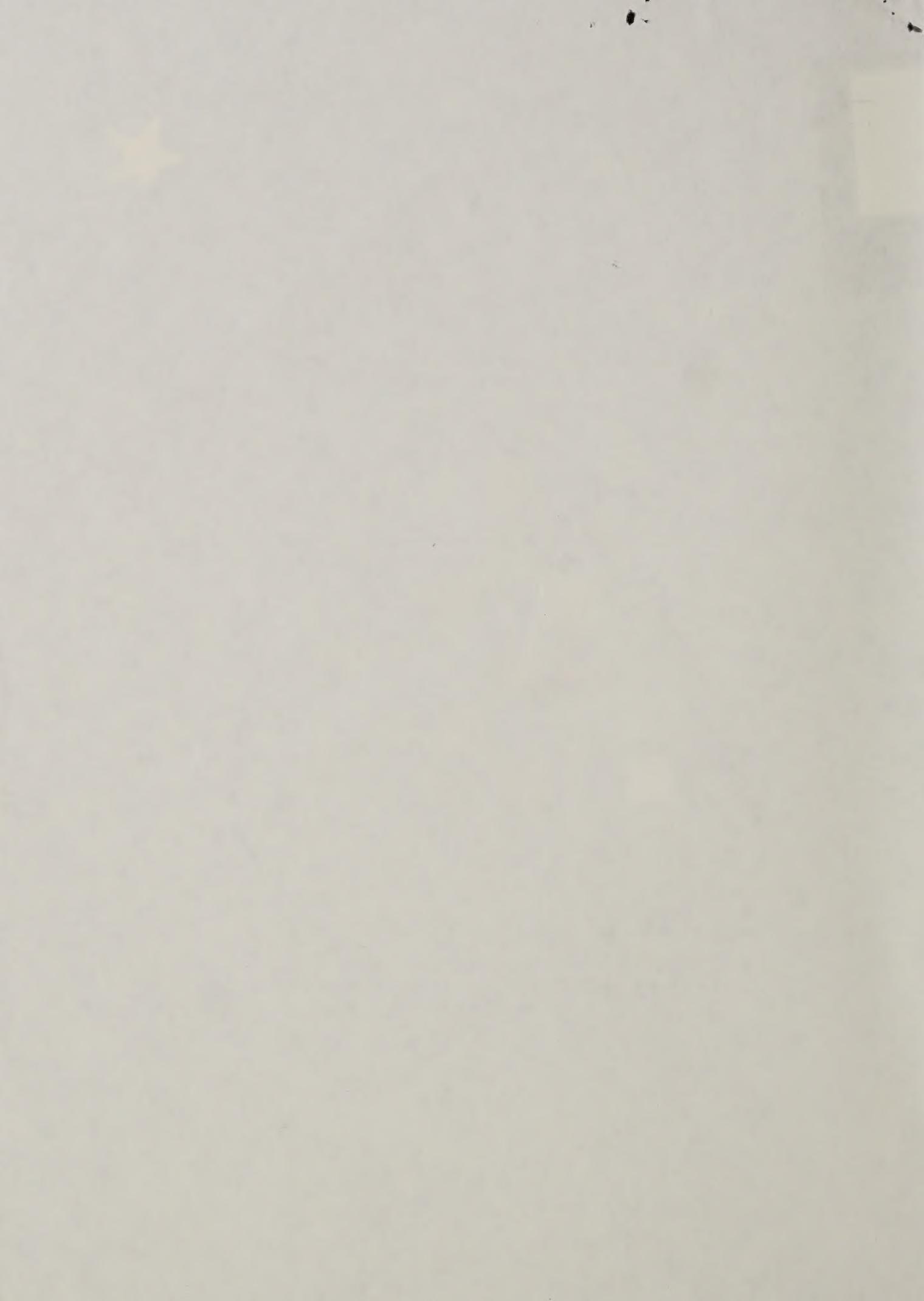
THIRD ANNUAL REPORT

**National Steering Committee - Management
Of Seed and Cone Insects**

A Report of the Portland, Oregon
Meeting - June 12-14, 1990

September 7, 1990

USDA Forest Service
Washington Office/Forest Pest Management
2121 C 2nd Street
Davis, CA 95616
(916)758-4600
FTS 460-1715



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I. INTRODUCTION

The second meeting of this committee during FY 1990 was held in Portland, Oregon, June 12-14, 1990 and included a field trip to five seed orchards.

A. Members Present

Larry Barber	R-8/FPM (Asheville, NC)
Scott Cameron	TX Forest Service (Lufkin, TX)
Gary DeBarr	SE/FIDR (Athens, GA)
Jed Dewey	R-1/FPM (Missoula, MT)
Wayne Dixon	FL Division of Forestry (Gainesville, FL)
Mike Haverty	PSW/FIDR (Berkeley, CA)
Tom Hofacker	WO/FPM (Washington, DC)
Charles Masters	Weyerhaeuser Co. (Centralia, WA)
Chris Niwa	PNW/FIDR (Corvallis, OR)
Max Ollieu	WO/FPM (Washington, DC)
Roger Sandquist	R-6/FPM (Portland, OR)
Tim Schowalter	Oregon State University
John Taylor	R-8/FPM (Atlanta, GA)
Jack Barry (Chairperson)	WO/FPM (Davis, CA)

Three other members, Peter deGroot and Kees van Frankenhuyzen (FPMI); and Dave Overhulser, Oregon Department of Forestry were not able to attend.

B. Purpose of Meeting

The purpose of the meeting was to review status of field projects, review technical project proposals, and to visit production orchards in the Willamette Valley.

II. STATUS OF PROJECTS

Summarized below is status of completed or on-going projects that relate to committee recommendations.

A. Field Experiments and Related Studies

1. Chris Niwa is conducting monitoring studies of Douglas-fir chalcid in Douglas-fir seed orchards.
2. Mike Haverty is conducting impact studies of seed and cone insects in western white pine and sugar pine seed orchards.
3. Tim Schowalter is conducting studies on impact of the conifer seed bug on western white pine flower buds, flowers, and cones.
4. Gary DeBarr is conducting field studies to establish lower threshold values of pesticides to control seed bugs.
5. Mike Haverty, Chuck Masters, and others have initiated single-tree studies to evaluate pyrethroid insecticides (Asana, Talstar and Capture) to control Douglas-fir cone gall midge. Also included in these studies is a test of dimethoate for control of the Douglas-fir cone gall midge.

B. Demonstrations

1. FSCBG aerial spray model is being evaluated in conjunction with tests conducted at the Schroeder and Horning seed orchards in Oregon. Field tests have been completed. A comparison test planned for the southeast was cancelled.
2. Larry Barber demonstrated use of fire to control white pine cone beetle pest of eastern white pine in Ohio, North Carolina, and Pennsylvania.

C. Cooperative Field Projects

1. Jose Negron and Larry Barber conducted tests using Bacillus thuringiensis to control Dioryctria spp. in slash pine in Florida and Louisiana.
2. Roger Sandquist conducted an aerial application project at the Schroeder and Horning orchards in Oregon to control a Douglas-fir pest complex.
3. Gary DeBarr, in cooperation with Chris Niwa, Jack Nord, Jose Negron, and Larry Barber, evaluated the feasibility of using a pheromone to disrupt mating of Dioryctria disculsa in loblolly pine.
4. Chuck Richmond is studying pesticide residues in western larch foliage from implants and Jose Negron is conducting similar implant studies in southern pines.

D. Administrative

Provisional list of pesticides currently registered for control of seed and cone insects is enclosed (Appendix A).

E. Other Comments and Observations

1. Committee members noted that there will be an increase in need for seed to support national programs - the Conservation Reserve Program, America Beautiful, the Stewardship Program.
2. Chuck Masters reported that the western seed orchard managers are very supportive of research identified by this committee and offer their orchards as test sites. Managers also are supportive of Forest Service efforts in seeking relaxation of pheromone registration requirements.
3. Gary DeBarr suggested we invite an FIDR manager to join the committee. It was noted that FIDR has been receiving committee reports and Max Ollieu has extended invitations to WO/FIDR to attend those meetings.
4. Jed Dewey reported that several seed orchards are coming on-line in Region 1.
5. Mike Haverty mentioned that support for seed and cone research at PSW is declining. The PSW seed and cone research program has need for laboratory support for residue, non-target, and environment analysis. Chris Niwa also noted that future of pheromone research at PNW is uncertain.
6. Roger Sandquist and Tim Hofacker commented on the excellent cooperation on seed and cone insect projects.
7. John Taylor offered to conduct NIPRS searches on pesticides registered for seed and cone insects. The process is complicated due to wide variation in registration approaches taken by registrants. John also agreed to provide copies of MSDS for these insecticides.
8. Bill Ciesla noted that Region 6 will be doing an environmental impact statement for Region 6 seed orchards. There are many seed orchards coming on-line in the Region.
9. Max Ollieu commented that since Jim Space became director of FPM, the FPM budget has increased by \$20 million. There are, therefore, funds to support committee recommendations.
10. Max Ollieu also noted that WO/FPM wants the national steering committees to establish priorities for all projects they recommend.

11. John Taylor will pursue the need to obtain pesticide rate data for seed bugs and use of a modeling approach to calculate application rates of hydraulic and other ground sprays.
12. Committee members noted the need for ground application technology and for seed orchards. This should include studies on tree injection equipment, drift, and safety.
13. The committee expressed concern about dilution of skills for managing seed and cone insects. Regions, Area, and Stations have the responsibility of taking the lead in this area with committee members serving as staff advisors to management on this issue.
14. Max Ollie and John Taylor reported progress in discussions with EPA about pheromone registration. This is being coordinated with ARS. There is a need for a protocol on developing and obtaining pesticide registration data.
15. Jim McDivitt, WO/Policy and Analysis has been assigned responsibility for a Policy Analysis Review of Forest Service Pesticide Policy.
16. Wayne Dixon, Florida Division of Forestry, in cooperation with Carl Fatzinger, Southeastern Forest Experiment Station, reported progress in developing an IPM Decision System for seed and cone insect management in slash pine.

III. REVIEW OF PROJECT PROPOSALS

The primary purpose of the meeting was to review proposals that will be submitted to FPM for funding in FY 1991. FPM has established a Project Task Force to review, prioritize, and recommend project funding. The National Steering Committee - Management of Seed and Cone Insects volunteered to review proposals and offer constructive suggestions before the proposals are submitted to the Task Force.

The committee reviewed eight proposals, offered suggestions and rated them numerically (Appendix B). The rating took into consideration potential of the research to reduce use of pesticides, a national vs local application of findings, and level of cooperation. We believe the exercise will result in improved project proposals and a coordinated seed and cone insect research program.

IV. FIELD TRIP

We toured five tree improvement facilities on June 13-14, 1990. See Appendix C for a complete description of the five facilities.

- A. J.E. Schroeder Seed Orchard, Oregon State Department of Forestry, St. Paul, Oregon. Acting Manager - Richard Yaeger.

Field tests are being conducted to evaluate aerial treatment of trees 30 feet in height.

- B. Research Center Seed Orchard, Georgia - Pacific Corporation, Eugene, Oregon. Manager - Matt Higgins.
 - 1. Need a pest monitoring system for deciding control strategies.
 - 2. Currently using prophalytic approach for insect control.
- C. Dorena Tree Improvement Center, Umpqua National Forest, Cottage Grove, Oregon. Manager - Joe Linn.
 - 1. Need technology to reduce amounts of pesticides.
 - 2. Need technical assistance to monitor movement of pesticides as a campground and stream are located about 1/4 mile from an orchard.
- D. Travis Tyrrell Seed Orchard, Bureau of Land Management, Lorane, Oregon. Manager - Fred Borchert.

Effective pest management has potential of greatly reducing need to manage the current planned net acreage of 420 acres of seed trees.

- E. Turner Seed Orchard, Weyerhaeuser Company, Turner, Oregon. Manager - Don Dotter.

Currently using prophylactic approach for insect control.

V. SUMMARY

The National Steering Committee - Management of Seed and Cone Insects met in Portland, Oregon, June 12-14, 1990, to review status of field projects, to review technical project proposals, and to visit seed orchards in the Willamette Valley. The Committee accomplished these purposes and through such meetings, focuses the national seed and cone insect management expertise on research and other needs to support the national tree improvement and reforestation program. We promote cooperation among the Federal, State, and private sectors. Eight proposals were reviewed, critiqued, and ranked by priority. Needs identified during the field trip included: method to monitor off-target movement of pesticides; system to monitor insect pests; reduction in use of pesticides; and pest control strategies tailored to individual orchards. The next meeting is scheduled to be held June 12-14, 1991, at Boone, North Carolina, hosted by John W. Taylor and Larry Barber.

PRODUCTS

Insects Registered for Control of Corn

J

BIO- or Registered for control of corn

insecticide

X - Insecticide

Insects USA C

1. Acetochlor (A) Acetochlor
Dow AgroSciences
Dow AgroSciences
Dow AgroSciences

2. Actellic (Bifenthrin)
Dow AgroSciences
Dow AgroSciences
Dow AgroSciences

3. Captan and Captan
(Folpet)

4. Carbofenthion

carbofenthion

5. Chlorotoluron
Dow AgroSciences

6. Deltamethrin (Deltamethrin)
Dow AgroSciences

7. Eptam (Eptam)
Dow AgroSciences

8. EW Agrochemicals
EW Agrochemicals

9. Gulfoyal Chemical Co.
Gulfoyal Chemical Co.

10. Imidacloprid
Bayer CropScience

imidacloprid

11. Imidacloprid
Bayer CropScience

12. Imidacloprid
Bayer CropScience

13. Imidacloprid
Bayer CropScience

(Continued)

Notes on Pesticides Registered for Control of Seed and Cone Insects

Pesticides that may be registered for control of seed and cone insects include:

<u>Pesticide</u>	<u>Manufacturer</u>	<u>Remarks</u>
Acephate (Orthene 75S)	Valent USA Corp.	Florida, Georgia, North Carolina, South Carolina, Virginia, and Texas
Azinphos-Methyl (Guthion 2S, 2L, 35WP, 2EC)	Mobay Corp. MicroFlo Co. West	Guthion 2EC
<u>Bacillus thuringiensis</u>	Novo BioKontrol Abbott Laboratories Sandoz, Ltd.	
Bifenthrin (Capture 2E) (Talstar)	FMC Corp. FMC	24C registration pending
Carbaryl (Sevin)	Rhone-Poulenc	To control western spruce budworm
Carbofuran	FMC Corp.	Deregistration pending
Dimethoate	American Cyanamid Co. IMC Corp.	
Esfenvalerate (Asana XL)	E.I. duPont de Nemours & Co., Inc.	
Malathion	Kerr McGee Chemical Co. (Fasco label)	Florida-slash pine flower thrips
Metasystox R	Bayer AG Mobay Corp.	Not used in South
Permethrin (Ambush) (Pounce)	ICI Agrochemicals FMC	All Southern States " " "
Propargite (Omite)	Uniroyal Chemical Co.	24C registration in Oregon?

Note: This is a tentative list that has not been verified. Check Federal and State labels before recommending or using these or any other pesticides.

(Continued)

Primary insects that target seed and cones by geographical area include the following:

Southeast

- Southern pines: Coneworms, seedbugs, white pine cone beetle, cone borer, seed worms, pine seed chalcid, pine conelet looper.

Northwest

- Douglas-fir: Douglas-fir cone gall midge; Douglas-fir scale midge; Douglas-fir cone moth; Douglas-fir cone worm; and Douglas-fir seed chalcid.
- Western White Pine: seed moth, coneworm, and cone beetle.
- Ponderosa Pine: seed worm and cone beetle.
- Sugar Pine: seed worms and cone beetle.
- General: seed bugs

Northeast

- Spruce: eastern spruce budworm; spruce cone midge; spruce cone worm; spruce cone maggot; and spruce seed moth.
- Eastern White Pine: white pine cone beetle; white pine cone borer; European pine shoot moth; seed midges.
- Red and Jack Pine: Jack pine budworm; red pine cone beetle; webbing coneworm; eastern pine seedworm; and Nantucket pine tip moth.

Pacific Southwest - Insects ranked within tree species by estimated order of importance.

- Douglas-fir: Douglas-fir gall midge causes serious annual losses in some coastal regions; Douglas-fir cone moth in some inland areas such as eastern part of Klamath and common in cone shipments to Placerville Nursery; Douglas-fir coneworm will become a problem as orchard develop; and Douglas-fir seed chalcid has impacted seed from some northern California forests.
- Ponderosa pine: Cone beetle; seedworms; coneworms;
- Sugar pine: cone beetle; and Dioryctria sp. (one known instance of serious damage in a breeding orchard).
- White and red fir: fir seed maggot is very common in seed collections; Dioryctria spp. common in collections.
- General: western conifer seed bug is a big concern to tree improvement foresters.

Northern Rocky Mountains

- Western White Pine: seedbug, coneworm, and cone beetle.
- Douglas-fir: coneworm, cone moth, western spruce budworm and midges.

Intermountain and Rocky Mountain

North Central

Southwest

APPENDIX B: PESTICIDE PROFILES

Chrysanthemum - Naphthalene-1,2-diol - 2,73

and Paraffin - Naphthalene

preparations for use in behavioral chemical control
Conceptual co. Inc. White pine - BARBER and YOUNG

Monitor by Oregon Items Co. In Doseless form
color panels - KIWA and SAUTQUIST

at all overwintering
and chalcid - Miles and HABDELIET

to measure spray deposits in robot
at all

100 mg each bordeaux, lime and copper
per square foot - DOWD and SANDWICH

100 mg - residue from Asophate and zinc

~~100 mg~~

Percent which number is being the ~~100~~

100 mg
100 mg
100 mg
100 mg
100 mg

100 mg
100 mg
100 mg
100 mg
100 mg

100 mg - residue

100 mg - residue

100 mg - residue

RANKING OF SEED AND CONE PROJECT PROPOSALS

	<u>Score</u>
1. Development of an aerial simulator - NEGRON and CAMERON.	2.75
2. Pilot test of Capture and Foray - NEGRON and BARBER.	2.75
3. Technology for use of behavioral chemicals to control <u>Conophthorus</u> sp. in white pine - BARBER and DEBARR.	2.50
4. Monitoring <u>Megastigmus</u> sp. in Douglas-fir with sticky color panels - NIWA and SANDQUIST.	2.25
5. Control of over wintering Douglas-fir cone gall midge and seed chalcid - NIWA and SANDQUIST.	2.25
6. Techniques to measure spray deposits in orchard canopies - BARBER, et al.	2.00
7. Monitoring with semiochemicals and control strategies for conifer seed bug - SOWER and SANDQUIST.	1.91
8. Accountancy - residue from Acephate implants - SANDQUIST, et al.	1.27

Ranked by priority with number 1 being the highest priority.

Species: Douglas-fir
Western Hemlock

Manager:

Year Initiated: 1974

Address: 3700 Mahony Rd. NE
St. Paul, OR 97137

Size (acres)

Phone: (503) 378-3429

Gross: 400

Net: 160

Location: About 20 miles north of Salem & 7 miles west of Woodburn, OR.

Legal Description: Sections 7 & 18, T.5 S. R.2 W., W.M.
and Sections 12 & 13, T.5 S. R.3 W., W.M.

Elevation: 170'

Orchard Seed will be Used by the Following Organizations, Ranger Districts, Work Units, etc.: Boise Cascade, Fred VanEck, Hampton Tree Farms, International Paper, Longview Fibre, Miami Corp., Oregon State Dept. of Forestry, Port Blakely Tree Farms, Simpson Timber Co., Starker Forests, Stimson Lumber Co., & Willamette Ind.

Seedzones Represented by this Material: 041, 051, 052, 053, 061, 062, 251, 261, 262, 452, & 461.

Acreage to be Reforested with Orchard Seed: Approximately 1.5 million.

Will Surplus Seed be Available for Sale? If so, when? (Include contact person if different from above) Each cooperator will determine if and when surplus seed will be available.

Has this Orchard been Certified by an Appropriate State Seed Certification Agency? If not, will it be? None have been certified to date, although some programs probably will be in the future.

CULTURAL PRACTICES

Vegetation Management and Cover Crops: The practice is to maintain a cover crop in all orchards. A variety of fescue and rye grasses are being used.

Fertilization: Nutrient levels are monitored and prescription mixed fertilizers are applied as needed.

Cone and Pollen Stimulation Techniques: Orchards are managed on an individual family target basis. Up to one half of the trees of each family are stimulated each year (based upon how closely that family's natural production meets its target). Stimulation treatments involve double overlapping girdles and calcium nitrate fertilization (at a rate of 200 pounds of nitrogen/acre).

Supplemental Mass Pollination: SMP is practiced in the younger orchards to enhance juvenile seedset. It is also being evaluated as a means of increasing genetic quality and increasing the number of filled seed per cone. The technique being used is to collect pollen and reapply it using an air powered wand.

Problem Cone and Seed Insects: Insect pests include gall midge, chalcid, Dioryctria, and seed bugs.

Insect Control Methods: As necessary, a "Turbo-Mist" orchard sprayer is used to apply insecticides such as Pydrin, Dimethoate and Metasystox-R.

Orchard Inventory / Monitoring System: An inventory/monitoring system is used to estimate crop size only. A survey is taken after the flowers are pendent, but prior to vegetative budburst. The number of flowers is estimated on randomly selected "survey" trees (about a 12% sample); every tenth survey tree is both estimated and counted, thereby calibrating the estimate. We are moving toward a more detailed method to give better

Individual family estimates where clean picking may not be desired. At harvest, each tree's cone production is measured and recorded, then cones are bulked into family lots.

Records/Database Management System: Data is managed on an AT-class PC, which is linked to a mainframe (via modem). Software includes "R:BASE for DOS" and "Lotus 1-2-3."

Irrigation System: None, however adjacent landowners supply water on an as needed basis.

Frost Control Methods: Helicopters have been planned for large seed needs (yet have never been used).

Harvesting Methods: A combination of ladders, manlifts and tree shakers have been used. Appropriate methods are a function of tree heights and crop size.

Special Problems: Spacing is a problem. Roguing leaves clumps and gaps; because of the close initial spacing, these clumps quickly become crowded and shaded.

Research Needs / Studies Underway: Improved SMP efficiency is needed and is currently being investigated. Better insect control above 30 feet in height is also needed and being investigated.

PROGRAM/BREEDING ZONE:	Molalla	N.W. ^a	Sundby Cr. ^b	Snow Peak	Umpqua
<u>ORCHARD INFORMATION</u>					
Species	DF	DF	DF	DF	DF
Age	15	11	16	11	16
# Clones/Families	57	25 ^c	11 ^c	62	79
Material Type	FS	FS	FS	FS	FS
Orchard Acreage	14	13	6	16	12
Tree Spacing:					
Initial	4x12	5x15	24x36	5x15	4x12
Current	24x36	30x45	24x36	30x30	24x36
Final	24x36	30x45	24x36	30x30	24x36
Design	geog.	syst.	syst.	geog. ^d	syst.
Seed Production:					
1980	7/20	0/0	0/0	0/0	0/5
1981	0/10	0/0	0/0	0/0	0/18
1982	0/9	0/0	0/0	0/0	2/5
1983	20/100	0/0	0/0	0/0	0/9
1984	7/37	0/0	0/0	0/2	0/7
1985	14/33	0/0	0/0	0/0	0/26
1986	136/530	0/0	0/0	0/42	143/575
1987	13/64	0/0	0/0	1/52	25/112
1988	202/672	0/0	46/210	12/99	241/870
Target #/year	90	10	35	95	35
Roguing Dates:					
First	1981	1984	1982	1984	1982
Next	1984	n/a	1985	?	1988
Replacement Date	1996	never ^e	2000	2005	2000
<u>GENETIC TEST INFORMATION</u>					
			Old	New	
# of Tests	9	3	3	4	8
Test Age	21	20	23 & 21	9	15, 16, 17
# of Genotypes	375	150	900	84	600
Test Type	OP	OP	OP	OP	OP
Last Measured	1983	1983	1988	1985	1988

PROGRAM/BREEDING ZONE:	Burnt Woods	Dallas Low	Dallas High	Vernonia ^b	Tillamook	Mehalem ^c
<u>ORCHARD INFORMATION</u>						
Species	DF	DF	DF	DF	W	DF
Age	14	7	7	18	9	planned
# Clones/Families	57	25 ^c	11 ^c	102	307	
Material Type	FS	FS	FS	FS	SC	
Orchard Acreage	15	17	10	36	3.2	
Tree Spacing:						
Initial	4x12	5x15	5x15	4x12	12x12	
Current	24x36	24x36	24x36	24x36	12x12	
Final	24x36	24x36	24x36	24x36	12x12	
Design	900g.	random	random	900g.	syst.	
Seed Production:						
1980	0/10	0/0	0/0	4/11	0/0	
1981	0/30	0/0	0/0	0/80	0/0	
1982	0/0	0/0	0/0	15/40	0/0	
1983	0/32	0/9	0/0	33/263	0/0	
1984	0/2	0/0	0/0	74/291	0/0	
1985	11/416	0/0	0/0	348/532	0/0	
1986	33/214	0/0	0/0	406/1427	0/0	
1987	10/35	0/0	0/0	87/334	0/0	
1988	186/771	0/0	0/0	593/2017	0/3	
Target #/year	145	102	60	300	3	120
Roguing Dates:						
First	1981	1988	1988	1982	1990	
Next	?	?	?	1985	?	
Replacement Date	2004	2009	2009	1997	?	
<u>GENETIC TEST INFORMATION</u>						
	Old	New		Old	New	
# of Tests	8	8	10	10	12	22
Test Age	21	7	17	10	21 & 23	14 & 12
# of Genotypes	161	300	225	202	900	270
Test Type	OP	OP	OP	OP	OP	OP
Last Measured	1987	1989	1987	1987	1988	1985
						1989

Additional Comments:

- a DNA will be merged with Mehalem Orchard (to the extent that genotypes are compatible between the two areas).
- b The Sunday Creek Orchard was separated from the Vernonia Orchard in 1988. Prior information was reported as part of the Vernonia Orchard.
- c Additional material will be infused in the future.
- d Geographic design by elevation of parent trees.
- e Three adjoining blocks that represent percentage from different land ownerships (separated by cooperators from north to south).

Species: Douglas-fir

Manager: Matt Higgins

Year Initiated: 1973

Address: P.O. Box 1618

Size (acres)

Eugene, OR 97440

Gross: 80

Phone: (503) 689-1221

Net: 50

Location: Cottage Grove, OR.Legal Description: Section 18, T.21 S. R.2 W., W.M.
and Section 13, T.21 S. R.3 W., W.M.Elevation: 900'Orchard Seed will be Used by the Following Organizations, Ranger Districts, Work Units, etc.: Georgia-Pacific timberlands in western Oregon.Seedzones Represented by this Material: 053, 061, 072, 081, and 461.Acreage to be Reforested with Orchard Seed: 315,000.Will Surplus Seed be Available for Sale? If so, when? (Include contact person if different from above) Yes, seed is available now. Contact Phil Hahn at the above address and phone number.Has this Orchard been Certified by an Appropriate State Seed Certification Agency? If not, will it be? No.

CULTURAL PRACTICES

Vegetation Management and Cover Crops: Mowing of natural cover crop. Strip spray herbicides within tree rows.Fertilization: Hand-applied urea at a rate of 200 pounds nitrogen/acre. Applied only to flowering trees.Cone and Pollen Stimulation Techniques: Girdling and CaNO₃ fertilization on one quarter of each orchard per year.Supplemental Mass Pollination: Considering but not yet operational.Problem Cone and Seed Insects: Gall midge, seed chalcid, Dioryctria, and seed bug.Insect Control Methods: Dimethoate is applied (0.5%) when flowers are three quarters pendant. Acecap implants have been used on a trial basis. Pydrin is also used for seed bug control in June-July.Orchard Inventory / Monitoring System: Survival and production surveys are done in the Spring.Records/Database Management System: IBM-AT computer for data processing and map making. Use Lotus 1-2-3 and Paradox software.Irrigation System: Under-Crown irrigation system with the capacity for irrigating about 4 acres at a time.Frost Control Methods: Under-crown frost protection linked to temperature monitoring system at adjacent container nursery.Harvesting Methods: Ladders and tree climbing.

RESEARCH CENTER SEED ORCHARDGEOGRAPHIA-PACIFIC CORPORATIONSpecial Problems: Rocky ground prohibits tree moving.Research Needs / Studies Underway: Acecap study on selected clones.Additional Comments: Rex Timber's holdings have reverted to their original status as belonging to Georgia-Pacific Corp.

PROGRAM/BREEDING ZONE:	Coquille-Nigh	Sizes	Sitkum
<u>ORCHARD INFORMATION</u>			
Species	DF	DF	DF
Age	15	15	15
# Clones/Families	60	33	37
Material Type	grafts	grafts	grafts
Orchard Acreage	5	5	5
Tree Spacing:			
Initial	12x16	12x16	12x16
Current	var.	var.	var.
Final	var.	var.	var.
Design	syst.	syst.	syst.
Seed Production:			
1980	0/0	0/0	0/0
1981	0/0	0/0	0/0
1982	0/0	0/0	0/0
1983	0/0	0/0	0/0
1984	0/0	0/0	0/0
1985	0/0	0/0	0/0
1986	0/0	0/0	0/0
1987	11/59	18/66	23/80
1988	5/35	11/48	8/37
Target #/year	15	15	15
Roguing Dates:			
First	1991	1991	1991
Next	1995	1995	1995
Replacement Date	2005	2005	2005
<u>GENETIC TEST INFORMATION</u>			
# of Tests	3	3	3
Test Age	1 & 2	1 & 2	1 & 2
# of Genotypes	91	60	66
Test Type	OP & PDX	OP & PDX	OP & PDX
Last Measured	N/A	N/A	N/A

PROGRAM/BREEDING ZONE:	Toledo-High	Toledo-Low	Springfield	RCCB*
<u>ORCHARD INFORMATION</u>				
Species	DF	DF	DF	DF
Age	15	15	15	1-6
# Clones/Families	55	55	60	730
Material Type	grafts	grafts	grafts	grafts
Orchard Acreage	6	6	13	8
Tree Spacing:				
Initial	12x16	12x16	12x16	12x20
Current	var.	var.	var.	12x20
Final	var.	var.	var.	24x20
Design	syst.	syst.	syst.	syst.
Seed Production:				
1980	0/0	0/0	0/0	0/0
1981	0/0	0/0	0/0	0/0
1982	0/0	0/0	0/0	0/0
1983	0/0	0/0	0/0	0/0
1984	0/0	0/0	0/0	0/0
1985	0/0	0/0	0/0	0/0
1986	0/0	0/0	0/0	0/0
1987	28/100	23.2/105	1/7	0/0
1988	33/146	11.6/72	24/81	0/0
Target #/year	20	20	?	n/a
Rouging Dates:				
First	1992	1992	n/a	16
Next	1997	1997	n/a	15, 12, 2, & 1 692
Replacement Date	2005	2005	?	OP & PROX 1988
<u>GENETIC TEST INFORMATION</u>				
# of Tests	3	3	none	16
Test Age	2 & 1	2 & 1		
# of Genotypes	182	182		
Test Type	OP & PROX	OP & PROX		
Last Measured	n/a	n/a		

* Clone Bank/Breeding Orchard

DORENA TREE IMPROVEMENT CENTERUSDA FOREST SERVICE, REGION 6
UMPOUA NATIONAL FORESTSpecies: Western White Pine
Sugar Pine

Manager: Joe Linn

Year Initiated: 1956

Address: P.O. Box 7

Cottage Grove, OR 97424

Size (acres)

Phone: (503) 942-5528

Gross: 88

Net: 60

Location: 6 miles east of Cottage Grove, OR.Legal Description: Section 23, T.20 S. R.2 W., W.M.Elevation: 700'Orchard Seed will be Used by the Following Organizations, Ranger Districts, Work Units, etc.: Throughout Oregon and Washington, primarily by National Forests.Seedzones Represented by this Material: 081, 082, 090, 451, 452, 462, 463, 472, 473, 482, 491, 492, 493, 501, 511, and 512.Acreage to be Reforested with Orchard Seed: Suitable lands throughout Washington and Oregon.Will Surplus Seed be Available for Sale? If so, when? (Include contact person if different from above) No.Has this Orchard been Certified by an Appropriate State Seed Certification Agency? If not, will it be? Yes.

CULTURAL PRACTICES

Vegetation Management and Cover Crops: Grass cover crop maintained by mowing and hand cutting close to trees.Fertilization: Ammonium nitrate (34-0-0) at 200 lbs/acre in alternate years.Cone and Pollen Stimulation Techniques: Nitrate fertilization.Supplemental Mass Pollination: None practiced at the present.Problem Cone and Seed Insects: *Lepidoglossus occidentalis* ("seedbug"), *Dioryctria abietivorella*, and *Conophthorus ponderosae*.Insect Control Methods: Sugar pine controlled crosses are remain bagged from the time of pollination through harvesting. ASANA has been used as part of administrative studies.Orchard Inventory / Monitoring System: Seed production records are kept on an individual-tree basis, and rotate to tree vigor and insect/disease problems. Pre-inventory crop estimation is not practiced.Records/Database Management System: Data managed primarily on a Data General mini-computer.Irrigation System: System is in place but is only used on an as-needed basis.Frost Control Methods: None.Harvesting Methods: Manlifts are used for sanitation picking. Filled-seed percentages are then estimated, then seed cones are aborted (often sold for decorative purposes).

DORENE TREE IMPROVEMENT CENTER

USDA FOREST SERVICE, REGION 6
UMPOUA NATIONAL FORESTSocial Problems: None.

Research Needs / Studies Underway: Studies testing effects of cytokinin sprays inhibiting conelet abortion. Assessment of bi-monthly sugar pine fertilization for control of conelet abortion. Also testing the effects of esterfaverine on Western white pine conelet abortion.

PROGRAM/BREEDING ZONE:	F13, 17-21, 23	F14 & 16	F15 & 16
<u>ORCHARD INFORMATION</u>			
Species	WP	WP	SP
Age	3-25	10-30	20-25
# Clones/Families	504	260	220
Material Type	FS/HS	grafts	grafts
Orchard Acreage	13	30	9
Tree Spacing:			
Initial			
Current			
Final	26x26	26x26	26x26
Design	random	random	random
Seed Production:			
1980	0/0	69/777	0/0
1981	0/0	242/1300	0/0
1982	0/0	113/761	0/0
1983	0/0	276/1194	0/0
1984	0/0	19/405	52 cones
1985	0/0	421/1792	24/700
1986	0/0	77/995	77/175
1987	0/0	77/468	0/0
1988	0/0	77/2580	77/100
1989	?	?	?
Target #/year	675	1100	1100
Roguing Dates:			
First	ongoing	ongoing	ongoing
Next			
Replacement Date			
<u>GENETIC TEST INFORMATION</u>		**SEE NOTES	
# of Tests			
Test Age			
# of Genotypes			
Test Type			
Last Measured			

**Genetic testing on wind-pollinated and controlled-cross progeny of selected wild 5-needle pines has continued since 1966. Genetically identified progeny grown here are inoculated with blister rust basidiospores and screened over 5 years for a variety of horizontal and vertical resistance mechanisms. Families are grouped into hazard-use classes on the basis of identified mechanisms.

Grafts from resistant families are outplanted in Dorene's seed orchards and in 19 on-site seed orchards on IF land in different breeding zones throughout OR & WA, incorporating different lines of resistance and as broad a genetic base as possible.

Approximately 5,200 white pine selections have been screened for rust resistance; 1,560 resistant families have been identified so far. An additional 3,900 sugar pines have been tested; 1,250 families have shown rust resistance.

Planning is underway for developing evaluation plantations to test growth/form traits of rust-resistant families. Long-term rust resistance will also be assessed in these tests.

TRAVIS TYRRELL SEED ORCHARDUSFS BUREAU OF LAND MANAGEMENT

Species: Douglas-fir

Manager: Fred Borchert

Year Initiated: 1982

Address: P.O. Box 121
Lorane, OR 97451

Size (acres)

Gross: 700

Phone: (503) 683-6445

Net: 420

Location: 12 miles west of Cottage Grove, OR.Legal Description: Sections 9, 15, & 21, T.20 S. R.5 W., W.M.Elevation: 700-1200'Orchard Seed will be Used by the Following Organizations, Ranger Districts, Work Units, etc.: Eugene, Coos Bay, Roseburg Districts of the BLM.Seedzones Represented by this Material: 071, 072, 252, 262, 270, 481, 491, and 492.Acreage to be Reforested with Orchard Seed: 800,000.Will Surplus Seed be Available for Sale? If so, when? (Include contact person if different from above) Possibly - contact person is District Geneticist Rich Kelly.Has this Orchard been Certified by an Appropriate State Seed Certification Agency? If not, will it be? No.CULTURAL PRACTICESVegetation Management and Cover Crops: A low-growing fescue cover crop has been established. Vegetation around trees is controlled by mulching. Herbicides will be used when available.Fertilization: Soils are deficient in phosphorus - this is applied during site preparation. Fescue cover crop is fertilized with nitrogen for 1-2 years until well established.Cone and Pollen Stimulation Techniques: Orchards will be stimulated for cone and pollen production in both the breeding and production orchards.Supplemental Mass Pollination: n/a.Problem Cone and Seed Insects: n/a.Insect Control Methods: Grafts are being sprayed with Lindane insecticide for control of Dioryctria damage.Orchard Inventory / Monitoring System: Rootstock are inventoried in the Fall to determine "graftability."Records/Database Management System: Orchard data are managed with "Revelation" database system on a Wyse 386 IBM-compatible computer. Field data are collected with a handheld Polycorder.Irrigation System: None.Frost Control Methods: n/a.Harvesting Methods: n/a.Research Needs / Studies Underway: Rootstock establishment and pollen flight studies are being conducted. Weather data are collected with a CR-21 (Campbell Scientific) weather station.

PROGRAM/BREEDING ZONE:	Gold Beach	Powers	S. Umpqua 1	S. Umpqua 2	S. Umpqua 3 & 4
<u>ORCHARD INFORMATION</u>					
Species	DF	DF	DF	DF	DF
Age	grafts	planned	0	0	planned
# Clones/Families	100	100	100	100	300
Material Type	grafts	grafts	RS	RS	grafts
Orchard Acreage	15	17	27	14	15
Tree Spacing:					
Initial	20x20	20x20	20x20	20x20	20x20
Current	20x20	n/a	20x20	20x20	n/a
Final	40x40	40x40	40x40	40x40	40x40
Design	random	random	RCB	RCB	RCB
Seed Production:					
1980	0/0	0/0	0/0	0/0	0/0
1981	0/0	0/0	0/0	0/0	0/0
1982	0/0	0/0	0/0	0/0	0/0
1983	0/0	0/0	0/0	0/0	0/0
1984	0/0	0/0	0/0	0/0	0/0
1985	0/0	0/0	0/0	0/0	0/0
1986	0/0	0/0	0/0	0/0	0/0
1987	0/0	0/0	0/0	0/0	0/0
1988	0/0	0/0	0/0	0/0	0/0
Target #/year	26	31	81	42	45
Roguing Dates:					
First	2007	2011	1996	1999	1993*
Next	2016	2020	2001	2004	1998
Replacement Date	2027	2031	2020	2021	2025
<u>GENETIC TEST INFORMATION</u>					
# of Tests	33	20	10	10	20
Test Age	13	7	9	6	11
# of Genotypes	937	420	360	360	690
Test Type	OP	OP	OP	OP	OP
Last Measured	1988	1986	1985	1988	1988

PROGRAM/BREEDING ZONE:	W.Umpqua 1	W.Umpqua 2	W.Umpqua 3	W.Umpqua 4 & 5	W.Umpqua 6 S.McKenzie 2
<u>ORCHARD INFORMATION</u>					
Species	DF	DF	DF	DF	DF
Age	0	0	planned	planned	planned
# Clones/Families	195	90	195	300-350	75
Material Type	RS	RS	grafts	grafts	grafts
Orchard Acreage	11	11	10	12	10
Tree Spacing:					
Initial	20x20	20x20	20x20	20x20	20x20
Current	20x20	20x20	n/a	n/a	n/a
Final	40x40	40x20	40x20	40x40	40x40
Design	RCB	RCB	RCB	RCB	RCB
Seed Production:					
1980	0/0	0/0	0/0	0/0	0/0
1981	0/0	0/0	0/0	0/0	0/0
1982	0/0	0/0	0/0	0/0	0/0
1983	0/0	0/0	0/0	0/0	0/0
1984	0/0	0/0	0/0	0/0	0/0
1985	0/0	0/0	0/0	0/0	0/0
1986	0/0	0/0	0/0	0/0	0/0
1987	0/0	0/0	0/0	0/0	0/0
1988	0/0	0/0	0/0	0/0	0/0
Target #/year	33	33	30	36	11
Roguing Dates:					
First	2001 ^d	2000 ^d	1994*	6	2004
Next	2006 ^e	2005 ^e	1999	7	2010
Replacement Date	2021 ^e	2021 ^e	2020	2025	2017
<u>GENETIC TEST INFORMATION</u>					
# of Tests	11	7	9	21	4
Test Age	5	6	11	11	10
# of Genotypes	390	180	390	730	280
Test Type	OP	OP	OP	OP	OP
Last Measured	1989	1988	1988	1988	1989

PROGRAM/BREEDING ZONE:	S. McKenzie	E. McKenzie	Wells Crk.	Coquille 16	Coquille 17
<u>ORCHARD INFORMATION</u>					
Species	DF	DF	DF	DF	N
Age	0	graft in '91	2	0	0
# Clones/Families	100	100	105	100	100
Material Type	BS	grafts	grafts	BS	grafts
Orchard Acreage	32	32	16	22	37
Tree Spacing:					
Initial	20x20	20x20	20x20	20x20	20x20
Current	20x20	20x20	20x20	20x20	20x20
Final	40x40	40x40	40x40	40x40	40x40
Design	RCB	RCB	Random	Random	Random
Seed Production:					
1980	0/0	0/0	0/0	0/0	0/0
1981	0/0	0/0	0/0	0/0	0/0
1982	0/0	0/0	0/0	0/0	0/0
1983	0/0	0/0	0/0	0/0	0/0
1984	0/0	0/0	0/0	0/0	0/0
1985	0/0	0/0	0/0	0/0	0/0
1986	0/0	0/0	0/0	0/0	0/0
1987	0/0	0/0	0/0	0/0	0/0
1988	0/0	0/0	0/0	0/0	0/0
Target #/year	58	56	26	38	67
Rouging Dates:					
First	2004	2004	2005	2008	2007
Next	2010	2010	2016	2016	2015
Replacement Date	2017	2017	2025	2028	2027
<u>GENETIC TEST INFORMATION</u>					
# of Tests	10	10	8	8	8
Test Age	10	10	16	13	12
# of Genotypes	200	300	210	360	280
Test Type	OP	OP	OP	OP	OP
Last Measured	1989	1989	1988	1986	1987

PROGRAM/BREEDING ZONE:	Type 1	Type 2	Not 1	Switzerland/ Mapleton	Lorena
<u>ORCHARD INFORMATION</u>					
Species	DF	DF	DF	DF	DF
Age	0	graft in '91	2	2	graft in '91
# Clones/Families	100	105	100	100	80
Material Type	BS	BS	grafts & BS	grafts & BS	grafts
Orchard Acreage	14	12	26	32	22
Tree Spacing:					
Initial	20x20	20x20	20x20	20x20	20x20
Current	20x20	20x20	20x20	20x20	N/A
Final	40x40	40x40	40x40	40x40	40x40
Design	RCB	RCB	RCB	RCB	RCB
Seed Production:					
1980	0/0	0/0	0/0	0/0	0/0
1981	0/0	0/0	0/0	0/0	0/0
1982	0/0	0/0	0/0	0/0	0/0
1983	0/0	0/0	0/0	0/0	0/0
1984	0/0	0/0	0/0	0/0	0/0
1985	0/0	0/0	0/0	0/0	0/0
1986	0/0	0/0	0/0	0/0	0/0
1987	0/0	0/0	0/0	0/0	0/0
1988	0/0	0/0	0/0	0/0	0/0
Target #/year	42	36	44	51	57
Rouging Dates:					
First	1996*	1993*	2000	2000	2005
Next	2001	1998	2006	2006	2011
Replacement Date	2025	2021	2013	2013	2018
<u>GENETIC TEST INFORMATION</u>					
# of Tests	10	10	8	7	6
Test Age	8	11	18	18	9
# of Genotypes	360	210	330	270	240
Test Type	OP	OP	OP	OP	OP
Last Measured	1986	1988	1986	1986	1985

Species: Douglas-fir

Manager: Don Dotter

Year Initiated: 1966

Address: 16014 Pletzer Rd. SE
Turner, OR 97392

Size (acres)

Gross: 281

Phone: (503) 327-2212

Net: 51

Location: 10 miles northeast of Albany, OR.Legal Description: Sections 4 & 9, T.10 S. R.2 W., W.M.Elevation: 180'Orchard Seed will be Used by the Following Organizations, Ranger Districts, Work Units, etc.: Weyerhaeuser and outside sales.Seedzones Represented by this Material: Oregon seedzones: 070, 071, 072, 252, 422, 442, 461, 472, 481, and 491; Washington seedzones: 030, 041, 241, 411 and 412.Acreage to be Reforested with Orchard Seed: 2.4 million.Will Surplus Seed be Available for Sale? If so, when? (Include contact person if different from above) Seed is available now. Contact Terry Smith at (206) 924-3292 or Richard Hankinson at (206) 924-2547.Has this Orchard been Certified by an Appropriate State Seed Certification Agency? If not, will it be? Yes.

CULTURAL PRACTICES

Vegetation Management and Cover Crops: Mow lawn fescue grass between tree rows. Spray tree rows with herbicides.Fertilization: Minimal adjustments, indicated by results of soil/foliar analyses.Cone and Pollen Stimulation Techniques: Alternating-year basis with double overlapping girdles + calcium nitrate applied at 200# N/acre. Gibberellins are used as needed to meet seed needs. Breeding work involved gibberellins and girdling.Supplemental Mass Pollination: On select clones to increase genetic gain.Problem Cone and Seed Insects: Gall midge, chalcid, Dioryctria, and seed bug.Insect Control Methods: Dimethoate, Pydrin, and Omite via air blast sprayer. Aerial spraying is occasionally used.Orchard Inventory / Monitoring System: Monitoring involves clonal quality analysis, reproductive phenology, cone and orchard efficiency, crop estimates, and insect populations.Records/Database Management System: Mainframe accessible via PC. Software programs include D:Base and Lotus 1-2-3.Irrigation System: Under-tree and drip systems.Frost Control Methods: Under-tree irrigation and helicopters.

Harvesting Methods: Manlifts, ladders, climbers, and tree shaker/fibert sweeper.

Special Problems: Gall midge, spider mites, flower abortion, and trees which respond poorly to flower stimulation.

Research Needs / Studies Underway: Flower stimulation of recalcitrant clones. Better understanding of nutritional needs of heavily flowering trees.

PROGRAM/BREEDING ZONE: ^a	Coos Bay Low	Coos Bay High	Springfield Low	Springfield High
<u>Elevation</u>				
Species	DF	DF	DF	DF
Age	21	15	20	14
# Clones/Families	121	50	120	50
Material Type	grafts	grafts	grafts	grafts
Orchard Acreage	14.3	1.4	13.7	5.3
Tree Spacing:				
Initial	10x26	15x25	10x26	15x25
Current	variable	variable	variable	variable
Final	same	same	same	same
Design	random	random	random	random
Seed Production:				
1980	146/370	0/0	133/333	0/0
1981	6/31	0/0	4/23	0/0
1982	139/354	0/0	62/174	0/0
1983	28/153	0/0	12/61	0.5/3
1984	207/819	8/26	85/306	2/11
1985	64/175	6/25	27/118	3/13
1986	799/1633 ^b	62.9/265 ^b	818/1537 ^b	2/7
1987	9/35 ^c	0.2/1 ^d	12/65	145/208
1988	125/369 ^c	0/0 ^d	88/269 ^c	0/0
Target #/year	140	14	135	55
Roguing Dates:				
First			1981, '83, '87, '88, '89	
Next			ongoing as genetic information becomes available	
Replacement Date			replaced by 2nd generation orchards by the year 2005	
<u>GENETIC TEST INFORMATION</u>				
	<u>Combined Testing</u>		<u>Combined Testing</u>	
# of Tests	70		90	
Test Age	17		16	
# of Genotypes	469		367	
Test Type		86% DOX, 14% SPM/PHC/OP		
Last Measured	1989		1989	

Additional Comments:

^a 2000' elevational split

^b Stimulated crop

^c Selective harvest from only top-ranked clones

^d Unharvested crop

PROGRAM/BREEDING ZONE:	Longview ^a Low	Twin Harbors Low	Vail High	Cascade ^b Mid
Elevation	Low	Low	High	Mid
ORCHARD INFORMATION				
Species	DF	DF	DF	DF
Age	15	15	15	14
# Clones/Families	50	50	50	50
Material Type	grafts	grafts	grafts	grafts
Orchard Acreage	9.5	1.9	2.8	2.1
Tree Spacing:				
Initial	15x25	15x25	15x25	15x25
Current	variable	variable	variable	variable
Final	same	same	same	same
Design	random	random	random	random
Seed Production:				
1980	0/0	0/0	0/0	0/0
1981	0/0	0/0	0/0	0/0
1982	0/0	3/11	0/0	0/0
1983	1/7.5	0.2/3	0/1	0/0
1984	3/20	0.6/4	3/12	0.6/10
1985	19/60	13/26	7/21	1/3
1986	14/46	82/170 ^b	6/26	2/7
1987	213/394 ^c	2/5	172/368 ^b	19/40 ^d
1988	0/0	12/34 ^c	0/0	0/0
Target	95	20	30	20
Rouging Dates:				
First			1981, '83, '87, '88, '89	
Next			ongoing as genetic information becomes available	
Replacement Date			replaced by 2nd-generation orchards by the year 2005	
GENETIC TEST INFORMATION				
# of Tests	49	37	38	47
Test Age	13	14	17	13
# of Genotypes	346	270	223	333
Test Type		86% are DOX, 14% are SPA/PML/OP		
Last Measured	1989	1989	1989	1989

Additional Comments:^a Combined information from low/high elevation programs^b Stimulated crop^c Selective harvest from only top-ranked clones^d Unharvested crop

